

LA-UR-19-28525

Approved for public release; distribution is unlimited.

Title: An Overview of Los Alamos Weapons Program

Author(s): Port, Michael Denis
Ventura, Jonathan S.

Intended for: Recruiting Event

Issued: 2019-08-22

Disclaimer:

Los Alamos National Laboratory, an affirmative action/equal opportunity employer, is operated by Triad National Security, LLC for the National Nuclear Security Administration of U.S. Department of Energy under contract 89233218CNA000001. By approving this article, the publisher recognizes that the U.S. Government retains nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or to allow others to do so, for U.S. Government purposes. Los Alamos National Laboratory requests that the publisher identify this article as work performed under the auspices of the U.S. Department of Energy. Los Alamos National Laboratory strongly supports academic freedom and a researcher's right to publish; as an institution, however, the Laboratory does not endorse the viewpoint of a publication or guarantee its technical correctness.

An Overview of Los Alamos Weapons Program

Jon Ventura
Director Nuclear and Military Affairs
Office of the Deputy Director Weapons

Mike Port
Nuclear and Military Affairs
Office of the Deputy Director Weapons



August 28, 2019



Managed by Triad National Security, LLC for the U.S. Department of Energy's NNSA

21st century geopolitical realities are challenging the existing security/political/economic structures and institutions

- Revanchist Russia
- Expansionist China
- Confrontational North Korea
- Turmoil in Europe
- Chaos in Middle East
- Nuclear proliferation
- Terrorism/Cyber
- Resource competition



China Aircraft carrier port call Hong Kong



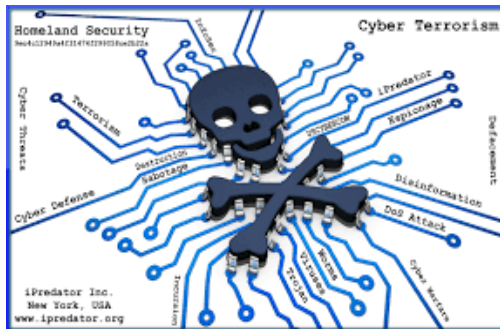
How countries compare

| Population | 173 million | 1.2 billion |
|-----------------|----------------|----------------|
| Religion | Mainly Muslims | Mainly Hindus |
| GDP per person | \$2,400 | \$2,600 |
| Life expectancy | 63 (M), 65 (F) | 67 (M), 72 (F) |

Military Strength

Strategic balance between India and Pakistan:

| Armed forces (troops) | INDIA | PAKISTAN |
|-----------------------|--------------|---------------|
| | 1.3 million | 610,000 |
| Surface warships | | |
| | 54 | 12 |
| Combat aircraft | | |
| | 886 | 340 |
| Nuclear missiles | | |
| | 30-35 | 33-60 |
| Submarines | | |
| | 16 | 5 |
| Military spending | | |
| | \$27 billion | \$5.2 billion |



The geopolitical realities demand the Laboratory's excellence for solutions to national security

- @12,000 employees
 - 2200 PhDs
 - 1100 veterans
 - @1800 summer students
- \$2.8B budget
- 36 square miles
- 47 technical areas
- 1,280 buildings / 9M sq. feet
 - 11 nuclear facilities
- 268 miles of roads (100 paved)



LANL is hiring @1000
new employees annually

LANL is *the* design laboratory for the majority of the Nation's on-alert deterrent

W76

W88

US Navy

W78

B61

US Air Force

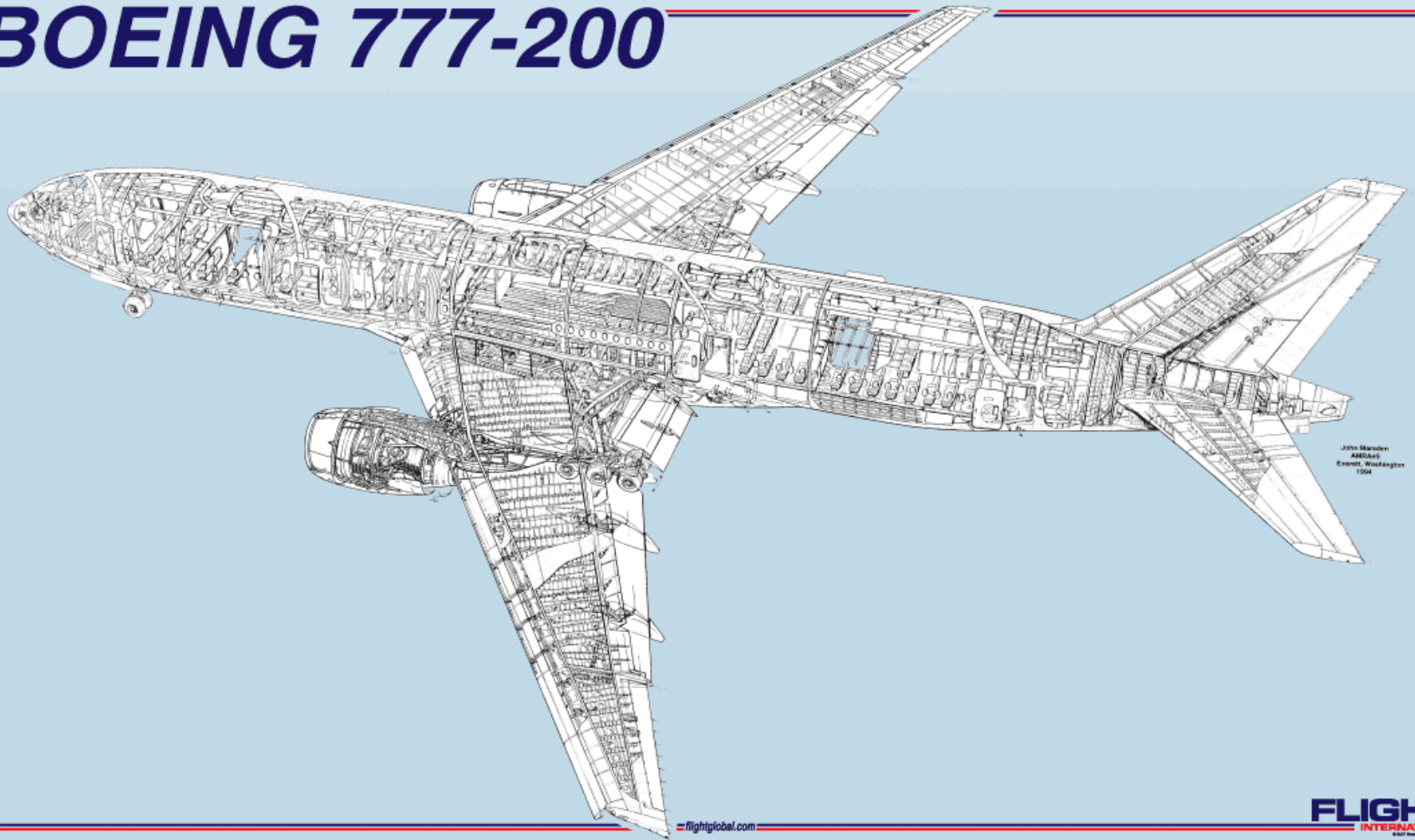


“Nuclear weapons have and will continue to play a critical role in deterring nuclear attack and in preventing large scale conventional warfare between nuclear armed states...”

Former Secretary of Defense Jim Mattis, Nuclear Posture Review

Would you fly in it after its been parked for 20 + years?

BOEING 777-200



John Marden
ASDC/Art
Everett, Washington
1994

flightglobal.com

FLIGHT
INTERNATIONAL
© 2007 Reed Business Information

Science, engineering and computations underpins all national security work of the laboratory

- **Experiments**

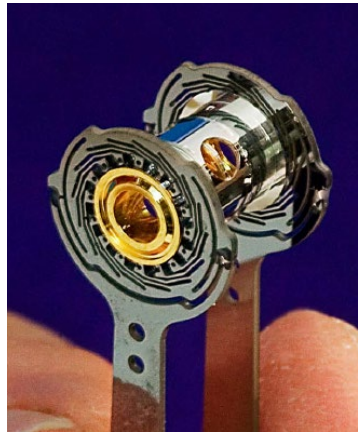
- 1000s experiments conducted annually to further our understanding and confidence in the stockpile

- **Modeling and simulation**

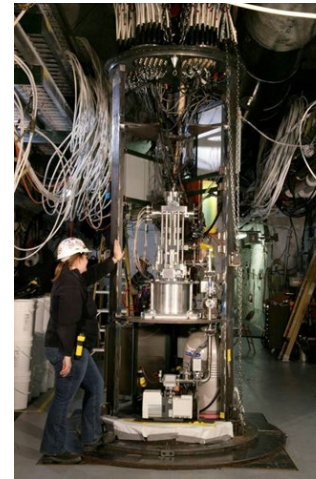
- World class computing hardware/software

- **Designer judgement**

- Experimental data used to check judgement
- Train next generation



High Energy Density (HED)
Experiments



Gas Gun

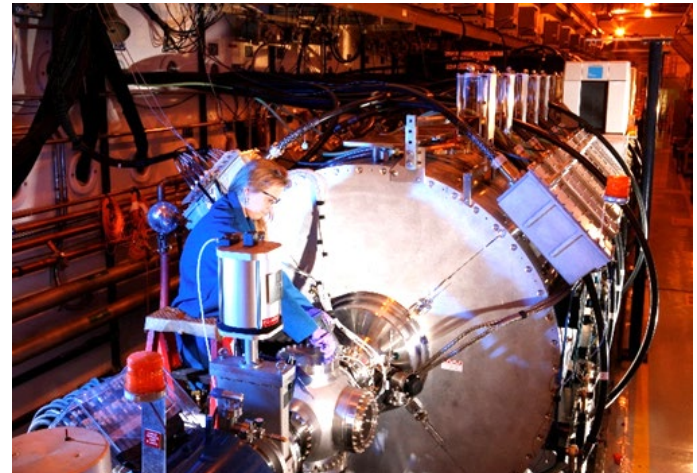
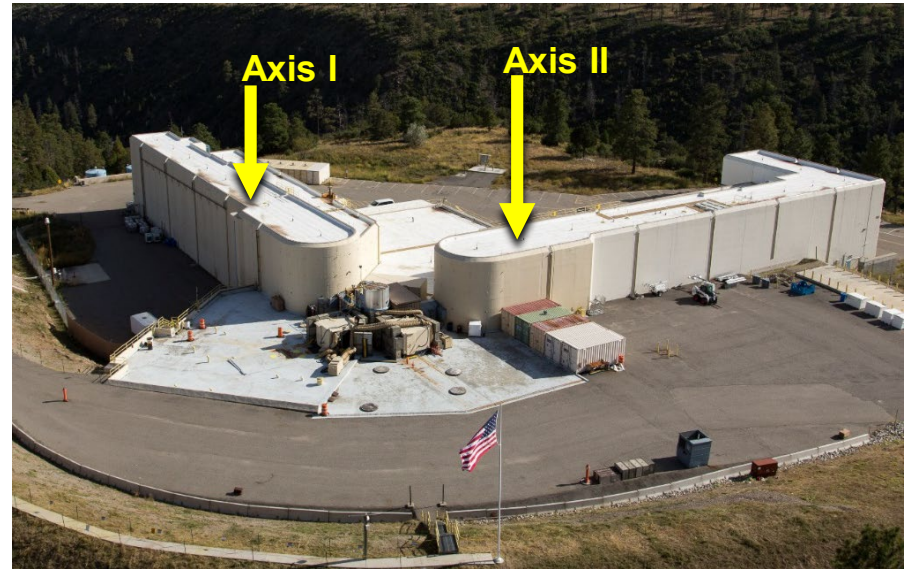


Large bore powder gun – measure differences
in performance of weapon materials of
interest



World class radiographic capabilities supports LANL/LLNL weapons and global security programs

- DARHT world-class X-ray radiography for non-nuclear tests
- Axis I: single image
- Axis II: four images
- Experiments fully contained to reduce environmental impacts and increase shot rate



Petascale Supercomputing is critical to Los Alamos' national security missions

- Stockpile challenges are increasingly complex as systems continue to age
- DARHT, LANSCE etc provide large data sets to resolve stockpile challenges
- Data sets require ever more capable machines that can quickly process information
- Capacity and Capability machines
 - Trinity
 - Fire, Ice

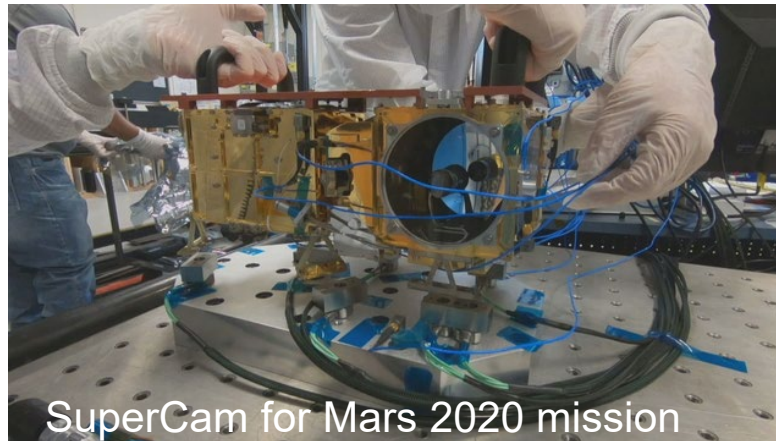
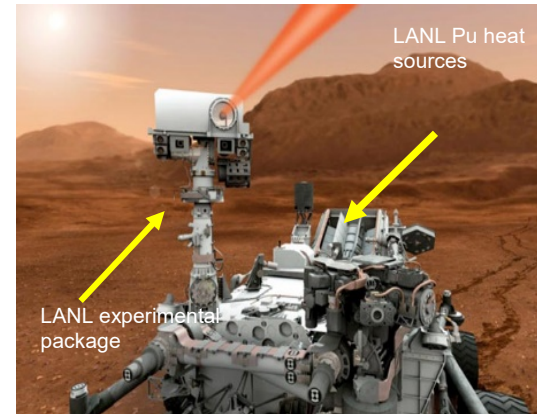


Los Alamos: center for plutonium excellence and critical to science and security

- Deliver parts for LANL experimental science
- Deliver parts for DoD Mission
 - 30 pits per year 2030
 - Partner with STRATCOM, Global Strike, USAF, USN.....
- Deliver parts for NASA and other federal agencies
- Provide technical options to meet new and emerging challenges
 - IAEA training
 - Additive manufacturing

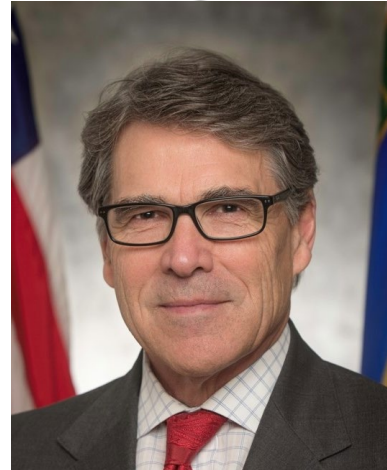


Mars Curiosity Rover



SuperCam for Mars 2020 mission

By law, Los Alamos Director reports on the state and health of the Nation's deterrent



LANL's multidisciplinary
science and engineering
capability



A Final Thought

“This Laboratory has always been something of wonder. Everyone one of you should be very proud that you are part of it. Take note it does wonderful things. Do well with it.”

***Roger Rasmussen
Trinity eyewitness
LANL employee 1944-2005***



Rasmussen 1921-2017